



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

log# M-330

**Date:** September 22, 1987

**In reply refer to:** M-87-51 through -66

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Commandant  
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Washington, D.C. 20591

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Commercial fishermen are involved in one of the highest risk industries in the world. The fishing industry in the United States has the poorest safety record of all U.S. industries. National statistics provided by the Coast Guard in testimony before the U.S. Congress 1/ indicate the following:

- o There are 33,000 documented U.S. commercial fishing vessels.
- o Annual losses of documented fishing vessels of more than 5 net tons averaged nearly 250 between 1981 and 1984. During the previous 10 years, losses had ranged between 150 and 200 each year.
- o The number of large (more than 100 gross ton) fishing vessels lost is five to seven times greater than the loss rate for U.S. oceangoing ships.
- o The death rate for fishermen is seven times the national average for all industry groups. Between 1981 and 1984, an average of 75 lives per year were lost in fishing vessel casualties.

In an agenda item dated February 19, 1987, prepared for upcoming meetings of the Maritime Safety Committee, International Maritime Organization, the Coast Guard noted that the average number of lives lost annually from U.S. fishing vessel casualties over the past several years has increased to 84. 2/

1/ Statement of Captain John E. DeCarteret, Chief, Marine Safety Division, District Thirteen, United States Coast Guard, before the House Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation and the Subcommittee on Fisheries, and Wildlife Conservation and the Environment, July 27, 1985.

2/ Submitted by the United States, Agenda Item 8, "U.S. Coast Guard Fishing Vessel Safety Initiatives," to the Maritime Safety Committee, International Maritime Organization, February 19, 1987.

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This problem is not limited to the United States. Norway <sup>3/</sup> has documented the number of deaths per 10,000 person-years due to accidents in fishing and other occupations:

o	fishing	13.7
o	mining	10.0
o	shipping	10.0
o	supply vessels	3.6
o	construction/civil engineering	2.5
o	industry on land	1.5

The National Transportation Safety Board has reported on more than 203 fishing vessel accidents. From 1978 to 1986, the Safety Board reported on an average of 20 fishing vessel accidents annually. These were catastrophic, and they often involved fatalities and/or injuries. Further, these accidents met the definition of a "major marine casualty," defined in 49 CFR Part 850 as involving:

- (1) the loss of six or more lives;
- (2) the loss of a mechanically propelled vessel of 100 or more gross tons;
- (3) property damage initially estimated as \$500,000 or more; or
- (4) serious threat, as determined by the Commandant (Coast Guard) and concurred in by the Chairman (Safety Board), to life, property, or the environment by hazardous materials. <sup>4/</sup>

Because of the continuing and increasing problem of serious and catastrophic losses, the Safety Board undertook a study to examine current actions undertaken by responsible agencies and organizations and, more importantly, to address future corrective actions to minimize and reduce the number of fishing vessel losses. <sup>5/</sup>

As part of this study, the Safety Board has reviewed the results of its investigation activities over the past 18 years, all Safety Recommendations issued by the Safety Board, and the responses of the organizations to whom the recommendations were made. Additionally, the Safety Board interviewed more than 100 persons directly involved in the commercial fishing vessel industry, including fishermen, marine surveyors, insurance brokers and underwriters, heads of fishing vessel associations, marine educators, Federal and State officials, naval architects, and others. The organizations and persons interviewed were a balanced segment of the commercial fishing vessel industry and a large number of those actively addressing the safety issues.

The Safety Board also reviewed applicable Coast Guard safety regulations for commercial fishing vessels as well as the voluntary Coast Guard safety programs designed to address safety concerns. Further, information on a variety of safety initiatives by fishing vessel associations, some foreign countries, marine surveyors, and others were reviewed and documented for the study.

<sup>3/</sup> Agenda Item 8, "Safety of Fishing Vessels, Including Possible Revision of the Torremolinos Convention for the Safety of Fishing Vessels, 1977," submitted by Norway, to the Maritime Safety Committee, International Maritime Organization, January 14, 1987.

<sup>4/</sup> Title 49 CFR Part 850, "Coast Guard-National Transportation Safety Board Marine Casualty Investigations."

<sup>5/</sup> For more detailed information, read Safety Study--"Uninspected Commercial Fishing Vessel Safety" (NTSB/SS-87/02).

The Safety Board's data on fishing vessel casualties indicate:

- o From 1978 to mid-1987, 203 accidents, involving 207 vessels and resulting in 147 deaths and 30 injuries, were investigated or caused to be investigated by the Safety Board. Property damage was estimated at \$165 million.
- o The 203 casualties occurred on the following waterways:

Atlantic Ocean	--	68 (33.5%)
Pacific Ocean	--	41 (20.2%)
Gulf of Alaska	--	37 (18.2%)
Bering Sea	--	26 (12.8%)
Harbors	--	23 (11.3%)
Gulf of Mexico	--	7 ( 3.5%)
Rivers	--	1 ( 0.5%)
- o Losses due to foundering, flooding, or capsizing accounted for 132 of the accidents (65 percent).
- o Losses due to fires and explosions accounted for 38 accidents (19 percent).
- o Losses due to grounding accounted for 21 accidents (10 percent). 6/

The Coast Guard reviewed its data sources and, based on vessel sinkings and fatal incidents involving the Coast Guard search and rescue and investigation activities, has indicated the general areas of safety concern from its perspective. The greatest contributor to losses, according to the Coast Guard, are foundering, flooding, and capsizing. Casualty data collected by the Coast Guard, which include a larger number of accidents than the Safety Board statistics, show that these events contributed to 43 percent of the vessel losses.

The Coast Guard has stated that some losses due to capsizing can be attributed to the way the fishing vessel was operated; for example, in some cases, the captain neglected to load or operate the vessel in accordance with recommended stability criteria. Some capsizings, however, were caused by safety equipment deficiencies. For example, had a bilge alarm had been installed in certain cases, it would have alerted the crew early to flooding of the vessel.

According to the Coast Guard, fires and explosions are the second major contributor to losses. Approximately 25 percent of the losses fall in this category. More than two-thirds of the fires and explosions resulting in casualties occur in engineroom spaces because of machinery or electrical failure. The Coast Guard has stated that if fire and smoke alarms had been installed in engineroom spaces, in many cases, this safety equipment could have alerted the crew to a fire in its early stages. 7/

6/ The other 6 percent were of unknown or miscellaneous causes.

7/ Statement of Captain DeCarteret before House Committee on Merchant Marine and Fisheries, July 27, 1985.

In the private sector, there is a relatively new database developed for the National Council of Fishing Vessel Safety and Insurance. This database is maintained by the Commercial Fishing Claims Register (CFCR) of the Marine Index Bureau. Data are collected from marine-related insurance companies on casualties and personal injuries. In the near future, the information contained in this database may provide a more complete picture of the casualties that occur in the commercial fishing industry.

The following issues, identified during interviews and from previous Safety Board accident investigation reports, are addressed in this study:

- o Licensing with qualification requirements for captains of uninspected commercial fishing vessels--In many casualties, the captain of the fishing vessel had no formal training in vessel safety. There are no Federal or State requirements specifying the captain's qualifications.
- o Mandatory versus voluntary training requirements for captains and crewmembers-- Not only captains but also crewmembers typically have no formal training in such important vessel safety issues as navigation, radio procedures, first aid, and use of lifesaving equipment. In its investigation of a number of casualties, the Safety Board has concluded that training could have improved the outcome of the casualty.
- o Minimum standards or guidelines for vessel stability--Stability characteristics were factors in a number of Safety Board-investigated casualties. If the stability characteristics were understood and if guidance were available to captains on the proper loading of vessels, some of these casualties would not have occurred.
- o Requirements for basic safety equipment--In many casualties, the absence of basic safety equipment drastically limited the ability of the captain and the crewmembers to survive in the sea's hostile environment. This study reviews the need for exposure suits, operable emergency radios, fire and bilge alarms, inflatable liferafts, and other equipment.
- o Telecommunications systems--Better telecommunications could have assisted land-based rescuers searching for vessels and crews in dangerous seas. This study examines the role of EPIRBs, and the proposed new Global Maritime Distress and Search System (GMDSS) communication system.
- o Alcohol and drug use in commercial fishing vessel operations--Concern is growing that a number of fishing vessel casualties may have been brought about or worsened by the use of alcohol and/or drugs. (There is very little documented evidence of this because the casualties have not been investigated for such use.)

- o Fishing vessel safety oversight--A number of Federal agencies have fishing vessel safety responsibilities. Additionally, a number of private and educational institutions are involved in fishing vessel safety. The study reviews these organizations and how they can improve fishing vessel safety. It also looks at such entities as marine surveyors, naval architects, and the marine insurance industry (brokers and underwriters) and how each might impact fishing vessel safety.

While Federal training requirements for captains and crewmembers will do the most to ensure that all commercial fishermen are adequately trained, action should be taken to prevent inadequately trained people from entering commercial fishing operations--for example, young and inexperienced college students. Fishing associations should immediately adopt policies to hire only people who have attended formal training courses and obtained a certificate of training.

Insurance companies can also assist by providing financial incentives in terms of premium reductions to promote formal training for commercial fishermen. Currently, a few fishing vessel associations have attempted to foster this concept by requiring formal training of their members in an effort to achieve reduced insurance premiums.

Training and licensing of uninspected commercial fishing vessel captains go hand-in-hand. There should be a Federal requirement that a captain of an uninspected commercial fishing vessel have a license and that it can be obtained only after meeting minimum safety qualifications. Most importantly, the captain should demonstrate minimum qualifications through written examination or oral examination if appropriate on practical problems in vessel safety, including rules of the road, vessel stability, firefighting, watertight integrity, and the use of critical lifesaving equipment. In addition, the captain should demonstrate eligibility through time in service to show proficiency in the skills required for commercial fishing operations.

The Coast Guard is equipped to institute such a licensing program and has already undertaken such programs for other marine operations--for example, the licensing of operators of uninspected towing vessels. Such a licensing program would raise the safety level in commercial fishing vessel operations in several ways. First, the captain would be better prepared to handle an unexpected life-threatening emergency; second, the captain could disseminate valuable emergency instructions and provide drills on the safety features of the vessel for his crew prior to departure; and finally, the training required for such a license could cause a greater appreciation of the need for the readiness of safety equipment and the periodic maintenance and inspection of that equipment.

There is a definite need for stability tests and understandable stability information to be uniformly provided to captains of uninspected commercial fishing vessels. The Coast Guard recognizes this need in its voluntary Navigation Circular NVIC 5-86, which devotes considerable attention to stability. However, NVIC 5-86 provides only voluntary guidance and, therefore, cannot effectively address the stability issue.

In order to address stability in any meaningful fashion, stability testing for all uninspected commercial fishing vessels must be required. Additionally, any time a fishing vessel undergoes major structural alterations that shift the vessel's center of gravity, such tests should be required. Further, stability characteristics and guidance on proper loading of an uninspected commercial fishing vessel must be provided to captains in a form they understand, and stability information must be kept on the vessel where the captain can easily find it.

In many casualties, the absence of basic safety equipment drastically narrowed the chances that the captain and the crewmembers would survive in the harsh sea environment. The basic safety equipment necessary to effectively meet most unexpected occurrences at sea--fires, capsizings, and foundering--should be required on all uninspected commercial fishing vessels. This includes exposure suits (in applicable waters), bilge and fire alarms, inflatable liferafts, an operable emergency radio, and EPIRBs.

The Coast Guard has addressed the need for such equipment but only on a voluntary basis (in the NVIC Circular 5-86 and in the Coast Guard-approved training courses). Another concern in Fishing Vessel Operations is alcohol and drug use among fishing vessel captains and crew. The only commercial fishing vessel casualty report in the Safety Board's records that addresses alcohol and/or drugs is the report of the loss of the WESTERN SEA. (Use of drugs by the master probably contributed to the loss of the vessel.) However, many of those interviewed for this study voiced concerns over the impact of alcohol and drug use in accidents. The Point Club has taken an aggressive posture on this issue and, as one of the association's requirements, signs are placed on fishing vessels indicating that insurance is voided if alcohol and/or drug use is involved in an accident. Since neither the Coast Guard nor the Safety Board have had the authority to require alcohol and/or drug testing, there has been no way to document or reject alcohol and/or drug use as factor or cause in fishing vessel casualties. Discussion with fishing vessel industry representatives during this study has led the Safety Board to believe that this is an area for fruitful investigation.

On February 9, 1987, the Coast Guard published in the Federal Register a Notice of Proposed Rulemaking (NPRM) addressing "Operations of a Vessel While Intoxicated." This rulemaking sets 0.10 percent blood alcohol concentration (BAC) as the standard for intoxication for persons engaged in commercial marine operations on vessels not subject to manning requirements and 0.04 percent for persons engaged in commercial marine operations on vessels subject to manning requirements. In its comments on the proposed rule, dated May 12, 1987, the Safety Board calls for a BAC of zero-- i.e., no measurable alcohol for any commercial marine operations; this would include uninspected commercial fishing vessel operations.

Drugs and alcohol have no place in the dangerous work environment of commercial fishing vessel operations. The Safety Board looks forward to the implementation of the Coast Guard's final rule and stricter enforcement of the prohibitions against alcohol and drugs in uninspected commercial fishing vessels as the result of improved Coast Guard accident investigations.

During the Safety Board's investigation of fishing vessel safety issues, the problem of toxic gas exposure was brought to its attention. Although the Safety Board has no evidence on this matter from vessel casualty investigations, a 1979 study by the Center for Disease Control <sup>8/</sup> suggests that this issue should at least be brought to the attention of fishermen in warm climates. The fermentation of decaying organic products, chemical reactions in bilge water, and the misuse of chemicals like bisulfite (used in keeping shrimp fresh) can individually or collectively produce a toxic atmosphere in an enclosed hold. The CDC report described the death of two crewmen and hospitalization of the captain after exposure to the toxic atmosphere of a fishing vessel's hold. The conclusion of the CDC was that death by asphyxia among fishermen in unventilated fishing vessel holds is a greater problem than previously recognized. The CDC recommended that unventilated air spaces should be well identified and crewmembers alerted to the hazard.

<sup>8/</sup> See Center for Disease Control, "Asphyxia Deaths of Shrimp Fishermen Due to Toxic Gas Exposure," EPI-78-90-2, January 30, 1979.

The CDC's examination of Coast Guard records indicated that from 1968 to 1978, 12 such incidents occurred, resulting in 37 deaths. Most of the incidents involved Gulf shrimpers or fish trawlers in warm waters and during warm months of the year, and all of the casualties occurred in unventilated holds.

This issue was brought to the Safety Board's attention by a private accident investigator in Houston <sup>9/</sup> who indicated that toxic gas exposure is a continuing problem; he recommended that ventilation of bilge areas should be a safety requirement. The Safety Board believes that the Coast Guard should review its files to see if toxic gas exposure causing deaths to fishermen is a continuing problem and, if so, formally publicize the dangers.

The Safety Board has investigated many accidents (in several modes of transportation) involving the substantial fire and toxic smoke hazards introduced by the use of polyurethane foams without effective safeguards. Such hazards are certainly present in the commercial fishing vessel industry. If there is an ignition source, polyurethane foam will ignite and the speed of its spreading flame will overwhelm such devices as hand-held extinguishers. Additionally, the high temperatures and toxic gases of a polyurethane fire preclude crewmembers from fighting such a fire in confined locations, as in a fishing vessel hold, for example.

The Safety Board has investigated three such casualties on uninspected commercial fishing vessels. Two of the casualties involved U.S. fish processing vessels (the AL IND ESK A SEA and the M/V WESTPRO) and one a Gulf shrimper (GOD'S GIFT). <sup>10/</sup> Fortunately, none of the accidents resulted in fatalities or injuries; the property damage losses were estimated at about \$16 million. Neither of the two fish processors had a fixed fire extinguishing system installed. Once fire ignited the polyurethane foam insulation, the crew was helpless to combat the flames because of the highly toxic gases that accompany burning polyurethane. In the casualty involving GOD'S GIFT, the captain attempted to control the fire with three CO<sub>2</sub> fire extinguishers, but the high heat, dense smoke, and toxic fumes produced by the burning polyurethane forced the captain to abandon ship.

There are two practical solutions that the Board believes should be considered. First, the use of polyurethane foam on any U.S. uninspected fishing vessel, particularly fish tenders and processors, should be allowed only if the vessel has a fixed fire extinguishing system capable of smothering such a fire. The Safety Board looks to the Coast Guard's ANPRM on fish processing vessels to address part of this concern. Second, the industry, perhaps through the National Fishing Vessel Safety and Insurance Council, should look for alternatives to polyurethane foam for insulation.

Fixed fire extinguishing systems are needed for other reasons as well. The Board has investigated many casualties in which a fire extinguisher did little to halt the fire. Even with the best of training, crewmembers have difficulty handling a fire at sea without an adequate fire extinguishing system (and functional fire alarms to provide some warning). The Safety Board reports issued as the result of fires and sinking of the uninspected commercial fishing vessels IBERIA, JEANNE D'ARC, SANDRA JANE,

<sup>9/</sup>Interview with private investigator/fishing vessel captain, Houston, Texas, April 1987.

<sup>10/</sup> For more detailed information, read Marine Accident Reports--"Brief Format Issue 1" p. 56 for the AL IND ESK A SEA; "Brief Format Issue 2," p. 59, for the GOD'S GIFT, and "Brief Format Issue 3," p. 28, for the WESTPRO.

CHESAPEAKE, and the PACIFIC PIONEER <sup>11/</sup> document the need for fixed fire extinguishing systems for uninspected commercial fishing vessels, particularly those operating where assistance in an emergency is not readily available. Further, there are no requirements for structural fire protection for uninspected commercial fishing vessels.

Many of the larger trawlers already have fixed systems installed using halon or other chemicals. The Safety Board believes that the Coast Guard should require fixed fire extinguishing systems on uninspected commercial fishing vessels.

In 1986, there were approximately 100,000 commercial fishermen and women operating 33,000 uninspected commercial fishing vessels. They participated in landing 60 billion pounds of fish valued at \$2.8 billion. <sup>12/</sup> They risk their lives daily in a hostile environment that demands safe operating practices, solid training in safety measures, and, in the event of an accident, adequate safety equipment in good working order.

However, there is no requirement that those who work on U.S. uninspected commercial fishing vessels have the training necessary to perform their jobs safely. And the Federal requirements for safety equipment applicable to uninspected commercial fishing vessels are inadequate.

The components to improve the safety level of the uninspected commercial fishing vessel fleet already exist. What is needed is for the Coast Guard to mandate the basic safety equipment requirements and implement licensing and training requirements at the Federal and private-sector level to:

- o provide training for captains and crewmembers;
- o establish licensing requirements, at a minimum for captains;
- o expand the basic safety equipment requirements; and
- o establish stability information requirements.

Even though commercial fishing is a specialized and dangerous skill, with the potential for catastrophic consequences if tasks are performed incorrectly, there are no training requirements. Training is available from some proprietary fishing vessel organizations and some universities involved in fishing vessel safety. However, there are insufficient incentives for fishermen to enroll in any training courses, particularly if the training courses are not free.

Two recent developments could significantly improve commercial fishermen training: the training courses and "Vessel Safety Manual," prepared jointly by the Coast Guard and the NPFVOA, and the Coast Guard's NVIC Circular 5-86, which provides technical information used in the Manual.

<sup>11/</sup> See Marine Accident Reports—"Brief Format, Issue Number 2" p. 22 for the CHESAPEAKE, p. 74 for the SANDRA JANE; Brief Format Issue Number 4" p. 4 for the IBERIA, p. 25 for the JEANNE D'ARC and p. 53 for the PACIFIC PIONEER.

<sup>12/</sup> U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Current Fishery Statistics No. 8385, "Fisheries of the United States, 1986," April 1986.

The need for safety improvements in uninspected commercial fishing vessel operations was perhaps best summarized by the president of the United Shell Fishermen's Association when he stated:

In conclusion, it should be the responsibility of the government to recognize those shortcomings in industry and take corrective measures and, in effect, say to those of us who formulate plans and who put profit before safety, "Your values are in error and we are going to insist that you straighten them out." 13/

Therefore as a result of its investigation, the National Transportation Safety Board reiterated Safety Recommendations M-85-68 made July 9, 1985, and M-86-11 made January 14, 1985, to the Coast Guard:

M-85-68

Seek legislative authority to require the licensing of captains of commercial fishing vessels, including a requirement that they demonstrate minimum qualifications in vessel safety including rules of the road, vessel stability, firefighting, watertight integrity, and the use of lifesaving equipment.

M-86-11

Seek legislative authority to require that stability tests be conducted and that complete stability information be provided to the captains of commercial fishing vessels.

In addition, the National Transportation Safety Board recommended that the U.S. Coast Guard:

Establish minimum safety training standards for all commercial fishermen, commensurate with their responsibilities, for all types of uninspected commercial fishing vessels. (Class II, Priority Action) (M-87-51)

Seek legislative authority to require uninspected commercial fishing vessel captains/owners to provide safety training to all crewmembers. (Class II, Priority Action) (M-87-52)

Seek legislative authority to require basic lifesaving equipment for uninspected commercial fishing vessels including but not limited to:

- o Exposure suits for each crewmember when the vessel operates in cold waters (Class II, Priority Action) (M-87-53)
- o Flooding detection alarms and automatic dewatering systems (Class II, Priority Action) (M-87-54)
- o Fire detection alarms and fixed firefighting systems for engine rooms (Class II, Priority Action) (M-87-55)

13/ Letter to the National Transportation Safety Board from President, United Shell Fishermen's Association, July 13, 1987.

- o Coast Guard-approved lifeboats or liferafts sufficient to carry all persons onboard (Class II, Priority Action) (M-87-56)
- o Emergency radios with an independent power source (Class II, Priority Action) (M-87-57)

Seek legislative authority to require basic safety equipment for fish processing vessels built before January 1, 1988, including but not limited to:

- o Exposure suits for each crewmember onboard when the vessel operates in cold waters (Class II, Priority Action) (M-87-58)
- o Flooding water detection alarms and automatic dewatering systems (Class II, Priority Action) (M-87-59)
- o Fire detection alarms and fixed firefighting systems for enginerooms (Class II, Priority Action) (M-87-60)
- o Coast Guard-approved lifeboats or liferafts sufficient to carry persons onboard (Class II, Priority Action) (M-87-61)
- o Emergency radios with an independent power source (Class II, Priority Action) (M-87-62)

Establish standards for the implementation and use of the new 406.025 MHz emergency position indicating radiobeacon for uninspected commercial fishing vessels, including proper handling, placement on the vessel, maintenance, and inspection practices. (Class II, Priority Action) (M-87-63)

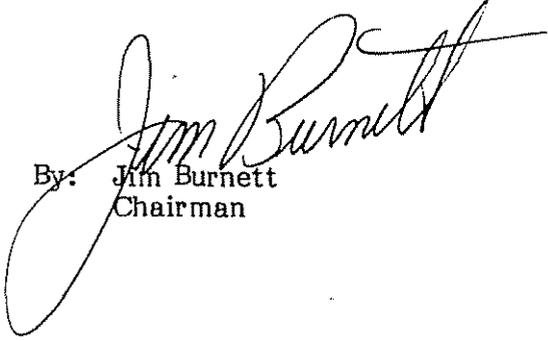
Seek legislative authority to require that all uninspected commercial fishing vessels be certified and periodically inspected by the Coast Guard or its recognized representative to ensure that the vessels meet all applicable Federal safety standards. (Class II, Priority Action) (M-87-64)

Include in the final rule on "Operation of a Vessel While Intoxicated" an absolute prohibition against the use of alcohol and/or drugs while engaged in commercial fishing operations. (Class II, Priority Action) (M-87-65)

Research and review casualty data on the potential for toxic gas exposure in unventilated spaces and publicize the danger to the commercial fishing vessel industry if such action is warranted. (Class II, Priority Action) (M-87-66)

Also, as a result of its investigation, the Safety Board issued Safety Recommendations M-87-67 to the National Oceanic and Atmospheric Administration and -68 and -69 to the National Council on Fishing Vessel Safety and Insurance.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, NALL, and KOLSTAD, Members, concurred in this recommendation.

By:  Jim Burnett  
Chairman